Pretest: Motion and Forces

Read each question. Circle the letter of the correct answer.

1. Which of these identifies a coordinate system for standardizing the measurement of movement and position?

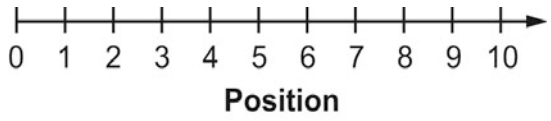
A. vector notation

B. coordinate plane

C. frame of reference

D. unit of measurement

2. An object moves at a constant speed in the direction of the arrow.



Which of these describes the object's movement?

A. positive velocity

B. negative velocity

C. positive acceleration

D. negative acceleration

3. Which of these defines acceleration?

A. the change in velocity

B. the change in displacement

C. the rate of change of velocity

D. the rate of change of displacement

4. What identifies the length of a velocity vector?

A. the type of velocity

B. the direction of the velocity

C. the magnitude of the velocity

D. the cause of change in velocity

5. A vector is oriented at angle θ with respect to the x-axis. Which trigonometric function is used to find the x component of the vector?

A. $\cos \theta$

B. $\cot \theta$

C. $\sin \theta$

D. $\tan \theta$

6. What is the cause of acceleration?

A. force

B. inertia

C. speed

D. velocity

7. Which of these describes equal but opposite forces resulting from the interaction of two objects?

A. field forces

B. net external forces

C. gravitational forces

D. action-reaction pairs

8. According to Newton's third law, what occurs when a hand exerts a force upon a cart?

A. The cart exerts a force of lesser magnitude on the hand.

B. The cart exerts a force of greater magnitude on the hand.

C. The cart exerts a force in the same direction on the hand.

D. The cart exerts a force in the opposite direction on the hand.

9. Which of these describes the magnitude of the gravitational force acting on an object?

A. mass

B. inertia

C. weight

D. frictional force

10. A device measures weight. Which of these does the device directly measure?

A. mass

B. force

C. velocity

D. acceleration

11. Which of these describes a main difference between scientists and engineers?

A. Engineers collect data to explain natural phenomena, while scientists observe the phenomena.

B. Engineers solve theoretical problems, while scientists create those theoretical problems.

C. Engineers use models and simulations to solve problems, while scientists design the simulations.

D. Engineers use math and science to solve problems, while scientists try to understand how the natural world works.

12. What is the main function of a decision matrix?

A. assigning a weight to each criterion

B. evaluating a design solution based on criteria

C. organizing the criteria based on their importance

D. adding the total points or weights for each design solution

13. An engineer is determining stress in a structure. How is stress defined?

A. Stress is the area of impact divided by force.

B. Stress is the length of impact divided by force.

C. Stress is the force divided by the area of impact.

D. Stress is the force divided by the length of impact.

14. A cable is used to support part of a bridge. What kind of stress on the bridge would the cable best help to support against?

A. tension

B. torsion

C. shear stress

D. compression

15. What is a constraint of an engineering design solution?

A. a design goal

B. a working model

C. a design limitation

D. a potential drawback